

## PART THREE

# Army Physical Readiness Training Activities

*“Half of life is showing up, the other half is doing something when you get there. The key to success is doing it well.”*

Stephen Van Camp, Chief of Doctrine, USAPFS

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## Chapter 9

### Posture And Body Mechanics

*“Good posture has many values for the soldier. First, a soldier is often judged by his appearance – the man with good posture looks like a good soldier, he commands attention. Secondly, It is an accepted psychological fact that good posture is associated with good morale – a man with good posture feels better and is more positive. A man with poor posture cannot feel as positive, consequently he may develop a negative and discouraged attitude. Thirdly, good posture permits the body to function most efficiently.”*

FM 21-20, Physical Training (January 1946)

Posture and body mechanics are critical factors for soldier performance, allowing them to move efficiently, with an ability to create great force and absorb heavy resistance. Posture is any position in which the body resides. It is further defined by the relationship of body segments to one another. Body mechanics is posture in motion. Though posture is often thought of as a stationary position, control of moving postures is perhaps even more important in task performance and injury control.

## SECTION I - POSTURE

### EFFECT OF POSTURE

9-1. When body segments are aligned properly, movement is efficient and injury risk is minimized. When body segments are not aligned properly, movement is less efficient and risk of injury is increased. Consider a soldier attempting to lift a heavy load from the ground with their legs straight and trunk twisted. Not only will the load seem heavier than if his knees were bent and back straight, but he is at risk for injury. The back injury that occurs during an improper lift is an obvious example of the relationship between posture, body mechanics, performance and health. Less obvious, but just as damaging, is the daily stress that takes its toll on the body when faulty postures are consistently assumed.

## EFFECT OF GRAVITY

9-2. Gravity molds body tissues. The body adapts to the stresses placed upon it. Gravity exerts a constant influence. When body segments are not aligned properly, such as when the head is too far forward, gravity works to further pull the head forward, placing undue stress on the structures of the neck and upper back. Over time, the neck adapts to faulty posture and natural neck movements may become restricted. Another example of this effect is seen among those who allow their shoulders to round forward. Gravity compounds this effect, limiting overhead range-of-motion as shown in Figure 9-1. By simply pulling the shoulders back as in Figure 9-2, the arms are then free to move fully overhead. To maintain this optimal position, soldiers will need to regularly stretch the chest muscles that are prone to tightness and strengthen the upper back muscles that promote proper carriage of the shoulder girdle. More importantly, they need greater awareness of the manner in which they carry the shoulder girdle while performing everyday tasks. Rounding of the shoulders is a common postural problem among soldiers, perhaps from emphasizing pushing exercises at the expense of pulling motions.



**Figure 9-1. Poor Posture Limits Range of Motion**



**Figure 9-2. Good Posture Allows Better Range of Motion**

## EFFECT OF EXERCISE

9-3. Like gravity, exercise also molds body tissues. As previously noted, imbalanced exercise practices may adversely affect posture. The exercise drills and activities listed in this manual, when regularly performed with precision, will enhance posture and improve body mechanics. For example, Exercise 2 of Calisthenic Drill 1, The Rear Lunge and Reach, provides an excellent stretch of the hip flexors, a muscle group that is prone to tightness. This tightness tilts the pelvis forward, creating an unbalanced base of support for the spine. This exercise also extends the trunk and upper body, compensating for the many hours of flexion throughout the course of the day.



Figure 9-3. Effect of Exercise

*"We are all sculptors and painters, and our material is our own flesh, blood, and bones."*

Henry David Thoreau

## SECTION II – IMPROVING POSTURE

9-4. Improving posture must be built upon the desire to move correctly and efficiently at all times. Regardless of the amount of instruction given and exercise performed, soldiers will habitually assume good postures only if they want to.

9-5. Good standing and sitting postures are characterized by vertical alignment of certain body segments. However, posture is not improved by forcefully holding the body in a position of ideal alignment. In fact, excessive effort to hold the body in a given posture will only serve to increase muscular tension and fatigue. Assuming naturally balanced postures shifts the weight of the body onto the bones, relieving muscles of the need to support weight bearing. Though the following recommendations are given in the form of a checklist, don't force your body to immediately conform to these ideals. Habits that have been reinforced over decades will take time to correct.

Regular and precise performance of the PRT activities in this manual will enhance posture and body mechanics.

**9-6. Checkpoints for Sitting (Figure 9-4):**

- Center the head between the shoulders and keep the chin level.
- Draw the shoulders comfortably back; don't allow them to round forward.
- Carry the chest comfortably up and out.
- Maintain the inward curve of the lower back; don't allow it to roll outward or inward excessively. Use a firm support between the lower spine and the backrest of the seat or chair to assist in maintaining the proper position.
- Maintain 90-degree angles at the hips and knees with the feet flat on the floor.



**Figure 9-4. Good (left) and Poor (center and right) Sitting Posture**

**9-7. Checkpoints for Standing (Figure 9-5):**

- Stand as tall as possible. The head should not be tilted or the shoulders raised.
- Center the head between the shoulders and keep the eyes and chin level.
- Slightly draw the chin inward by pressing the neck back toward the collar. Moderately elevate the chest without strain. If the chest is raised properly, the abdomen flattens normally. Don't draw in the stomach to the extent that normal breathing is restricted.
- Relax the shoulders and let them fall evenly. If the shoulders round forward, draw them back slightly, without strain.
- Set the pelvis and hips level.
- Keep the knees straight but not locked.
- Direct the feet forward without strain. Variations in skeletal alignment will prevent some individuals from assuming the feet-forward position.
- Distribute the weight evenly between the heels and balls of the your feet.



Figure 9-5. Good (left) and Poor (right) Standing Posture

## COMPENSATING FOR THE EFFECTS OF COMMON POSTURES

9-8. Given the broad definition of posture (any position in which the body resides), the number of postures soldiers may assume is infinite. However, soldiers assume the same few postures throughout most of the duty day. The postures can be categorized as the flexed posture, associated with sitting, bending forward, lifting, and crouching and the upright posture, associated with standing, walking, marching, and running. The body will eventually conform to accommodate these postures. Some muscles will become over-stretched and weak, while others will tighten and lose flexibility. The resulting muscle imbalances will hinder natural movement and increase the likelihood of injury. It is important to regularly compensate for time spent in these prolonged postures by performing exercises or activities that restore the optimal flexibility of muscles and joints:

- Performing extension compensates for flexion. The most common posture for many individuals is seated. This posture is associated with flexion of the spine. Unless great effort is made to sit straight (or a roll is used to maintain the inward curve of the low back), the trunk tends to assume a C-shape. The longer this flexed posture is assumed, the greater will be the effect on muscles around the trunk. The back muscles and ligaments become over-stretched and weak, while muscles on the other side of the trunk (for example, hip flexors) get tighter and pull the pelvis into an unbalanced position. In Figure 9-6 below, the soldier on the right is in a flexed position. Compensation for prolonged time in this position would occur if the soldier assumed the prone position of extension demonstrated by the soldier on the left. To prevent the imbalances associated with too much flexion, soldiers should regularly perform extension exercises and activities such as those in Figure 9-7.



**Figure 9-6. Soldiers In The Flexed (right) And Extended (left) Postures**



**Figure 9-7. Performing Extension To Compensate For Flexion**

- Performing decompression compensates for compression. Many soldiers spend the majority of their day on their feet. The weight of the body and equipment creates a compressive effect on the spine and other weight-bearing joints. In fact, at the end of the day enough fluid will have been compressed out of the spinal discs that height measurements will usually indicate that soldiers are noticeably shorter. Joints that are overly compressed may eventually compromise mobility. In order to compensate for compressive forces on the spine, it is useful to perform exercises or activities that decompress as shown in Figure 9-8.



Figure 9-8. Performing Decompression To Compensate For Compression

### SECTION III - BODY MECHANICS

9-9. Body mechanics (posture in motion) is the ability to control body movement. Many discussions of posture are limited to static positions, such as sitting and standing. Good posture during movement is imperative to efficiency and injury control. Just as good posture requires balanced alignment of the body, so does exercise. Many soldiers use awkward movements as they struggle to perform one last repetition. **When body mechanics are poor, the exercise serves little purpose and may do more harm than good.** The activities in the PRT system were designed to reinforce proper body mechanics. Of special importance to PRT leaders are the checkpoints given for each exercise. Adherence to these checkpoints ensures optimal execution of the exercise. Over time, skillful movements become second nature to the soldier. When this occurs, physical readiness is enhanced and injury risk is minimized.

### PREPARING THE BODY'S CORE

9-10. Muscles work to initiate and control movement. Because movement is more apparent than the lack of it, the focus is most often on the movement that muscles create. Less obvious though is the "braking" force that muscles apply to movement. Without this braking force, nearly all movement would be extremely sloppy and potentially dangerous. Around the body's core (trunk and pelvis), this braking action of the muscles becomes extremely important for two reasons. First, the spine and pelvis are the base of attachment for many muscles that power the arms and legs. Without a strong, stable base of support, using these muscles is like firing a cannon from a canoe. Secondly,



the body's center of gravity is within the core area. Keeping it there leads to balanced, skillful movement. This is the job of the core muscles and they do it primarily by putting on the brakes. The ability to maintain balanced postures is often referred to as stabilization. The load on the soldiers shown in Figure 9-9 demands strength and stability from the body's core.



**Figure 9-9. Soldiers Moving Under Load**

9-11. To promote stable postures during exercise, it is essential that soldiers learn to prepare the core. A simple, two-part action prepares the core for exercise:

- **Set the hips.** This is also referred to as the neutral position of the pelvis. This position is found by first tilting the pelvis forward (buttocks goes back, belly goes forward, and the inward curve of the low back is increased), Figure 9-10a. Second, tilt the pelvis backward (the buttocks and belly draw inward as far as possible, flattening the curve of the low back), Figure 9-10b. Then settle in between these two extremes, Figure 9-10c.
- **Tighten the abdominal muscles.** Once the hips are set, tightening the abdominal muscles will ensure readiness of the muscles that control and protect the trunk. To contract the correct muscles, imagine drawing the gut straight inward as if preparing for a blow to the mid-section or trying to appear slimmer than you really are. Keep the hips set as the abdominals are tightened, Figure 9-10c.

9-12. After setting the hips and tightening the abdominal muscles, the soldier's posture should appear balanced and ready for exercise. The soldier should not associate these two actions with a stiff, awkward posture. The goal is not to eliminate all movement from the core, but to simply control the natural motion that will occur.



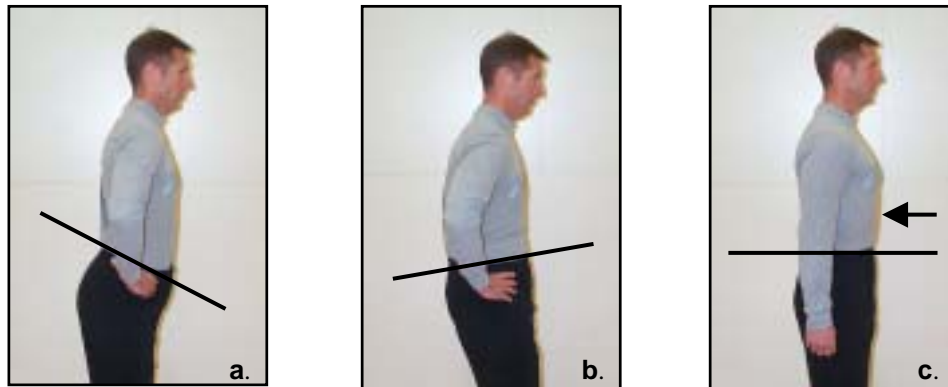


Figure 9-10. Set The Hips and Tighten The Abdominal Muscles

## POWER POSITION

9-13. Proper body mechanics are essential for the powerful movements required of soldiers. From the power position (Figure 9-11), the soldier is ready to:

- respond to or deliver aggression
- squat to lower or lift a heavy load
- accept a heavy load being passed from another individual
- sprint to cover



Figure 9-11. Power Position

9-14. To assume the power position, first, set the hips and tighten the abdominals as described above. From the straddle stance, placing one leg six to eight inches behind the other, and crouch so that the hips go rearward and the trunk counterbalances by leaning slightly forward. The balls of the feet accept most of the body weight. The shoulder blades are pulled slightly back, but not forced. The chest is high, head is level, and elbows and knees are comfortably bent (about 45-degrees).

## LIFTING FROM THE GROUND

9-15. Power the lift with the legs, not the back (Figure 9-12). Then continue to bend at the hips and knees to lower the body. In order to protect the back, keep the hips set and the abdominal muscles tight throughout the lift. Keep the load close to the body from start to finish. When soldiers must turn under load, do so by pivoting the feet rather than twisting the trunk.



Figure 9-12. Lifting From the Ground

## LIFTING OVERHEAD

9-16. Most of the power for pushing an object overhead comes from the legs. To transmit leg strength through the trunk and arms to the object being pushed, set the hips and tighten the abdominal muscles. Hands should be placed shoulder width apart with the upper arms in line with the trunk. Squat slightly then forcefully straighten the legs in a coordinated effort with the action of the arms (Figure 9-13).



Figure 9-13. Lifting Overhead

## PUSHING

9-17. Push with the hands in front of the shoulders and the upper arms close to the body. This technique creates a mechanical advantage that is lost the farther the hands and arms are from this position. Because this method is the most functional, the calisthenic drills use this technique (Figure 9-14).



Figure 9-14. Pushing

## PULLING/CLIMBING

9-18. When pulling an object that is on the ground or horizontal to it, soldiers must assume the power position first. Set the shoulder girdle by pulling the shoulder blades slightly to the rear. This is also important when pulling the body upward from an overhead grasp. Climbing will often require the legs to power the accent or gain leverage on support structures (Figure 9-15). This will often demand significant strength from the core muscles. The exercises in the climbing drill prepare soldiers for these demands.



Figure 9-15. Pulling/Climbing

## ROTATION

9-19. Prepare the body's core to control rotation. Coiling (rotating) the body then quickly uncoiling is the primary source of power for many soldier and athletic tasks such as throwing a punch, heaving an object onto a platform, or kicking a ball (Figure 9-16). Each of these activities produces a torque on the spine and other joints that may cause injury if the forces are uncontrolled. Control comes from setting the hips, tightening the abdominals, and allowing the hips and knees to bend so as to absorb some of the stress of rotation.



Figure 9-16. Rotation

## JUMPING AND LANDING

9-20. Land softly with alignment of the shoulders, knees, and balls of the feet. Land first on the balls of the feet with the heels touching down last. Bending of the hips and knees allows the legs to serve as coils that absorb the impact of the landing. The trunk should be straight but leaning forward so that, when viewed from the side, the shoulders knees and balls of the feet are aligned (Figure 9-17).



Figure 9-17. Jumping and Landing



## LUNGING

9-21. Maintain the knee of the forward leg in vertical alignment with the ball of the foot. Do not allow the knee to go beyond the toes nor to the right or left of the foot. Lunging is a component of many soldier tasks (Figure 9-18). The picture below, demonstrates soldiers performing a proper lunge as they begin a sprint for cover. Calisthenic and dumbbell exercises that involve lunging prepare soldiers for functional tasks such as this.



Figure 9-18. Lunging

## MARCHING

9-22. The head and trunk checkpoints for standing also apply to marching. Allow the arms to swing naturally, though crossing the midline of the body is excessive. Allow the hips to naturally rotate forward with each stride. Do not allow the knees to lock at any point in the walking cycle. Stride naturally, landing on the heel and pushing off with most of the weight toward the big toe. The feet remain directed forward. Do not strain to keep the feet directed forward, since variations in skeletal alignment will prevent some individuals from assuming the feet-forward position. Foot marching with a load on the back will require some forward lean of the trunk. Do not, however, allow the trunk and shoulders to round forward (Figure 9-19).



Figure 9-19. Marching or Foot Marching

## RUNNING

9-23. Refer to Chapter 15 for a discussion on running form.

## CHANGING DIRECTION

9-24. Soldiers may be required to quickly change direction while maintaining forward movement or to reverse direction. To maintain forward movement, plant on the outside leg with plenty of bend in the hips and knees. The foot should turn slightly inward toward the change of direction. To reverse direction, as in the shuttle run, reduce forward speed and crouch so that the body is directed approximately 90 degrees from the forward direction. At the lowest point of the crouch, body weight should rest primarily on the leg closest to the new direction of travel, shifting momentum in that direction (Figure 9-20).

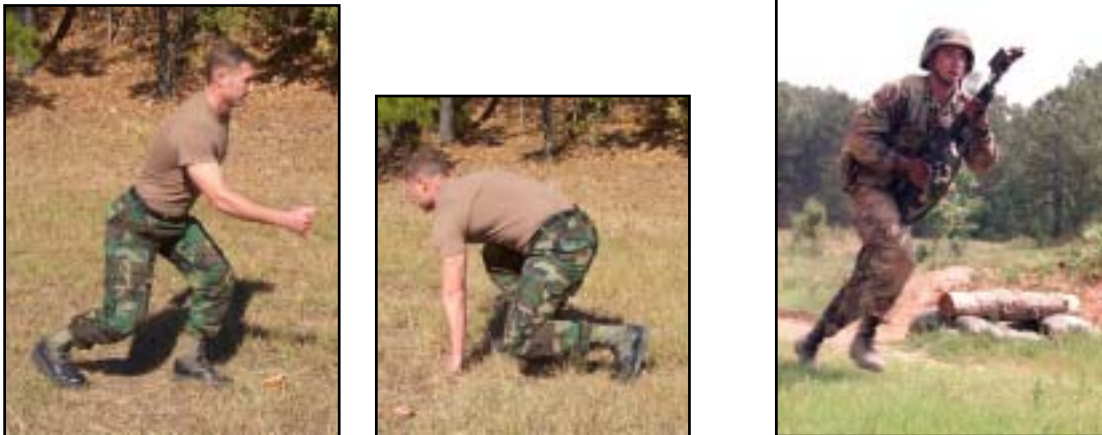


Figure 9-20. Changing Direction

## SECTION IV - SUMMARY

9-25. Posture matters. Soldiers are often judged by their appearance. A balanced, alert posture portrays readiness, while sloppy posture does just the opposite. PRT leaders must understand the fundamental principles of posture and body mechanics. They must demonstrate proper carriage of the body and demand the same from their soldiers, not only during PRT, but also throughout the day. When soldiers live in good postures, the results are better performance, fewer injuries, and a confidence borne of grace, balance and power.

*“In the training of anyone, nothing equals the importance of proper posture; it is the very foundation upon which the entire fabric of a successful course in physical training must be founded.”*

LTC Herman J. Koehler